EPA United States Environmental Protection Agency

Waste Programs

Supplement to Proposed Plan for Cleanup of Del Amo Waste Pit Area

Strategy for Setting Soil Cleanup Standards to Protect Groundwater Under EPA's Proposed Short-Term Soil Cleanup Standard for Alternative 4

This supplement to the Del Amo Waste Pits Proposed Plan provides the rationale and basis for soil cleanup standards. It offers a higher level of detail and technical complexity for those readers with an interest in such material. It was not included in the main Proposed Plan fact sheet in order to ensure clarity and reasonable brevity for the general reader. However, because EPA proposes to incorporate the following technical information, methods, and requirements into its Record of Decision for the waste pits, EPA is making this supplement available for comment. It is to be considered formally a part of EPA's Proposed Plan.

Purpose of Soil Vapor Extraction

In the Proposed Plan fact sheet, EPA identifies Alternative 4 as its preferred cleanup method. Alternative 4 features a RCRA-equivalent cap over the waste pit area and soil vapor extraction (SVE) of contaminated soil beneath and adjacent to the pits (see main Proposed Plan). This alternative is a final remedy for waste and contaminated soil and an interim, or short-term, remedy for groundwater. Alternative 4 is an interim remedy for groundwater because the cap and SVE system would limit the amount of contamination that the waste pits could add to groundwater until the final groundwater cleanup plan is selected in the summer of 1997. The final groundwater remedy will take into account contributions from all sources of groundwater contamination, including the waste pits.

Even if a groundwater treatment system were installed now to reduce groundwater contamination to federal or state drinking water standards, concentrations in the groundwater under the pits will remain high, relative to those standards, possibly for decades. This is because of the possible presence of Non-aqueous Phase Liquid (NAPL) and the very high concentrations of benzene in the groundwater under the pits. Therefore, it is not reasonable to immediately require the cleanup of soils so that the incremental groundwater concentration does not exceed drinking water standards.

EPA's proposed interim strategy is to implement short-term cleanup

standards for soil using the SVE system. The SVE system would reduce concentrations in the soils under the waste pits to levels such that the waste pits incremental contribution to groundwater contamination is relatively insignificant compared to the existing groundwater concentration. The incremental, or additional amount of contaminants that the waste pit area would add to groundwater over time is referred to conceptually as the "waste pits incremental groundwater concentration." The Focused Feasibility Study (FFS) presented several technical options for defining what level of groundwater impact should be considered significant, as well as options for setting soil cleanup standards that SVE will have to meet.

SVE Scenarios

Alternative 4 consists of two scenarios related to the extent of the soil vapor extraction zone. Scenario 1 represents the case where SVE is applied only to coarse-grained soil. In general, SVE is more effective in removing contaminants from coarse-grained soil. Scenario 1 represents a "minimum SVE" approach. Scenario 2 represents the case where soil vapor extraction would be applied to both fine and coarse-grained soil. Scenario 2 represents a "maximum SVE" approach. The lateral (plan-view) extent of the SVE zone is the same under either scenario 1 or 2.

EPA is proposing scenario 2 because scenario 2 provides a higher level of certainty that groundwater will be protected. Because waste is left in the pits indefinitely in Alternative 4, groundwater must be protected indefinitely. EPA therefore proposes to apply soil vapor extraction to as much of the soil below the pits and above groundwater as is reasonable and practical when weighed against cost and effectiveness factors. This proposed plan represents a conceptual design only. The actual width and total depth of the soil vapor extraction zone will vary from location to location to some degree, based on a highly detailed review of soil characteristics and contaminant distribution to be made during remedial design and system installation.

Scenario 2 provides reasonable long-term protection of groundwater because it: (1) offsets any uncertainties inherent in site characterization, assumptions, and calculations, which become more critical over long time periods; (2) provides the widest reasonable "buffer" between the contamination in the pits and the groundwater table in the event that the water table rises and contacts contaminated soil; and (3) maximizes the amount soil under the pits treated to EPA's proposed short-term soil cleanup standards.

What is NAPL and why might it be present at Del Amo?

Non-aqueous Phase Liquid, or NAPL, is a chemical in its pure form that has not yet dissolved in water or been adsorbed into the soil, and which dissolves in water only very slightly. NAPL is sometimes called "residual product." Once in the ground, NAPL can be extremely difficult to find and cleanup. Since it dissolves very slowly, the chemical may remain for long time-frames and is resistant to flushing. While NAPL has not been observed to flow into wells under the waste pits, the extremely high concentrations of benzene in groundwater strongly indicate that some residual product may be present.

shows Table 1a range of short-term soil performance standards for SVE that were considered by EPA. Short-term performance standards are soil cleanup levels that the SVE system would be required to meet until the final groundwater remedy is selected. These options for short-term performance standards vary depending on the amount of incremental increase in existing groundwater contamination that would be allowed and the attenuation factor which would be assumed.

Attentuation of Contaminants

Attenuation refers to the decrease in concentration of contaminants as the contaminant passes through the soil away from a fixed source. Processes such as natural biodegradation and adsorption may occur in the intervening soil, causing concentrations to be less at the water table, than directly under the pits. The degree of attenuation from all processes and causes in the soil under the pits is not known. However, a reasonable range for this total attenuation can be assumed. It is conservative to assume that the real attenuation factor is in the low end of its reasonable possible range. This conservative assumption tends to underestimate the amount of attenuation and, therefore, overestimate the amount of contaminants arriving at groundwater over time. Conversely, assuming the real attenuation factor is in the high end of its reasonable possible range, this approach may underestimate the amount of contaminants arriving at the water table. The short-term performance standards considered by EPA spanned a range from more-to-less conservative assumptions about attenuation and allowable incremental groundwater concentration.

Soil Contribution to Groundwater

Case number 2 allows an incremental increase in existing groundwater concentrations of 0.5%. Or, said another way, if the soils are cleaned to this concentration, the waste pits could not contribute more than an additional 0.5% of the existing groundwater concentration to the groundwater. Under this scenario, the total attenuation factor from the vadose zone to the groundwater is assumed not to exceed 10. For example, if there is 400,000 parts per billion (ppb) of benzene in groundwater under the pits today, then SVE would be applied so that the incremental increase in groundwater concentration coming from the soils and waste would not be expected to exceed 400,000 x 0.5%, or 2,000 ppb (assuming that the attenuation from the contaminants to the groundwater is a factor of 10). The resulting 2,000 ppb of contamination is insignificant compared to 400,000 ppb which currently exists in the groundwater. EPA prefers case number 2 because it is based on a reasonably small attenuation factor which ensures a higher degree of protection for groundwater.

When the existing groundwater concentrations decline, the performance standard for SVE would also fall with it, always keeping the pits' groundwater impact at 0.5% or less of the existing groundwater concentration. For example, if the groundwater concentration fell to 100,000 ppb, then SVE would be applied such that the incremental groundwater concentration from soils under the pits would not exceed 100,000 x 0.5% =

500 ppb.

For More Information

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TABLE 1
SHORT-TERM PERFORMANCE STANDARDS FOR SOIL VAPOR EXTRACTION
Del Amo Waste Pit Area

Case #	Incremental Increase in Existing Concentrations of Benzene in GW (%)(a)	Attenuation Factor	Short-Term Performance Standard for Benzene (mg/kg)
1	0.5	1	0.5
2	0.5	10	5.0
3	0.5	100	50
4	2	100	200
5	2	1,000	2,000

(a) Assumes an existing average benzene concentration of 100 mg/L.
GW = Groundwater
Short Term Performance Standard = % Increase in Existing Groundwater Concentration x 100mg/L x Attenuation Factor

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